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UNPUBLISHED PRELIMINARY DATA

Smithsonian Institution
United States National Museum
Washington, D. C.

To

The National Aeronautics and Space Administration

Semi-Annual Report For The Period July 1 to December 31, 1964

Research Carried Out Under Grant No. NsG-688
Museum No. M-529

During the period July 1 to December 31, 1964 the following program investigations have been carried out:

A. Organization

Most of the time included in this semi-annual report period has been spent setting up laboratories and hiring personnel, both of which were expedited after the arrival in Washington of the principal investigator on September 1. The following persons have been hired:

8-3-64	Charles E. Fiori	- Electronic Technician
10-25-64	Nancy Cavanaugh	- Clerk-Typist
11-4-64	Irene Anargirou	- Secretary (Typing)
11-17-64	Eugene Jarosewich	- Chemist
12-2-64	Becky Jo Fredriksson	- Museum Technician

The last position specified in the grant, Meteorite Petrologist, will be filled by Dr. Brian Mason, who will join this group March, 1965. After acquiring a staff, the principal investigator initiated the installation of special facilities necessary primarily for the new microprobe which, although somewhat delayed, arrived on November 6. This instrument, the most advanced commercial model, is more complicated than others thus requires more adjustments and testing during installation but the precise alignment is now practically completed. However, some specific analyses, as mentioned below, have been accomplished.

B. Current Meteorite Investigations

1. The chemistry laboratory is investigating the content of Ge and Ga in iron and stony-iron meteorites. The concentration of these two elements has frequently been used as a means to classify meteorites. However, it is not well know how Ga and Ge are distributed. Our recent results indicate that they may be concentrated in different phases. Systematic chemical analyses on different separated phases as well as on different extracts and solutions are in progress. These analyses

are supplemented by microprobe analyses in an attempt to localize high concentrations (0.1% or more) particularly of Ge in accessory phases, e.g., schreibersite, troilite, cohenite, or in grain boundaries. The microprobe is a valuable tool for surveying each sample before attempting wet chemical analyses. It is essential to know this distribution in order to evaluate the importance of the inferred Ge-Ga groupings (see Goldberg, et al and Lovering et al) in regard to the genesis of iron meteorites. A paper of our preliminary results is scheduled for the 1965 spring meeting of the American Geophysical Union.

2. Roy S. Clarke, Jr. has completed a chemical analysis of the Harleton meteorite. Petrographic and microprobe analyses will be completed shortly, whereupon a description of this meteorite will be prepared for publication.

3. The Horse Creek meteorite has been studied metallographically by E. P. Henderson, and various phases have been analyzed by means of the microprobe. Of particular interest is the abundant Ni_3Si, as well as the kamacite which has Si in solid solution. A paper on this meteorite is scheduled for the American Geophysical Union meeting.

4. Several meteorite samples subjected to recrystallization under various temperature and redox conditions have been prepared and are in the process of being analyzed by means of microprobe and x-ray diffraction techniques.

5. In connection with work carried out on the Orgueil meteorite in cooperation with Dr. Kurt Boström at the University of California in San Diego on NASA Grant No. NsG 317-63, our chemist, Gene Jarosewich has analyzed samples of this same meteorite for water soluble Mg and SO_4^{-2} as well as for native sulfur. The Mg value is lower than earlier reported, although the SO_4^{-2} and native sulfur fall within the limits of earlier determinations.

6. An extension of earlier work on the Murray carbonaceous chondrite is in progress. Specific attention is being given to the chondrules, most of which appear different from those in ordinary high or low group chondrites.

7. Thin and polished sections of many different meteorites have been prepared for routine microprobe work. Once basic descriptions are completed, it is the intention to keep these sections, together with untreated samples, available for study by other research groups or persons.

8. With the cooperation of Dr. Ed Olsen, Chicago Natural History Museum and partial support from NASA Grant No. NsG 317-63, current investigations of phosphates in iron meteorites are being continued. Of interest are sarcopside and graphtonite, almost pure iron phosphate, which have been found by means of microprobe and x-ray diffraction techniques, along with farringtonite.

9. E. P. Henderson, in cooperation with Brian Mason and Dr. Chalmers, Sydney, have been assembling statistical data on weight and shape of australites from the field collection of 1963-64 (field work supported by other agencies).

10. During this period the following papers have been published.

FREDRIKSSON, K. and KEIL, K. (1964). The iron, magnesium, calcium and nickel distribution in the Murray carbonaceous chondrite. Meteoritics (In press). NASA TM X-54,050 Preprint

FREDRIKSSON, K. and ANDERSEN, C. A. (1964). Electronprobe analysis of copper in meneghinite. American Mineralogist 49 (9 X 10): pp. 1467-1469, Sept.-Oct.

HENDERSON, E. P., (1965). Hexahedrites. Smithsonian Miscellaneous Collections 148 (5).

Twenty-five (25) reprints of these articles will be sent as soon as they are available.

January 4, 1965

Kurt Fredriksson
Principal Investigator

REFERENCES:

Lovering, J. F., Nichiporuk, W., Chodos, A., and Brown, H. (1957) "The distribution of gallium, germanium, cobalt, chromium, and copper in iron and stony-iron meteorites in relation to nickel content and structure." Geochim.Cosmochim. Acta II, 263-278.

Goldberg, E., Uchiyama, A., and Brown, H. (1951) "The distribution of nickel, cobalt, gallium, palladium and gold in iron meteorites." Geochim. Cosmochim. Acta 2, 1-25.

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